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Helpful Websites

State

Virginia Department of Emergency Management
www.vaemergency.com

Virginia Department of Conservation and Recreation
www.dcr.state.va.us

Virginia Department of Agriculture and Consumer Services
www.vdacs.state.va.us

Virginia Cooperative Extension
www.ext.vt.edu

Virginia Department of Environmental Quality
www.deq.state.va.us

Federal

FEMA Region 3
www.fema.gov/regions/iii/index.shtm

Living Out of Harms Way Pays Off

SOUTHAMPTON COUNTY, VA — For 30 years Robert and Gale Stradley’s home on Canal Drive in Franklin, Va., escaped the intermittent threat of flooding. In 1999, Hurricane Floyd changed all that.

“Floyd was a very, very different storm. It dumped an unbelievable amount of water on us and then the wind just held the water in,” said Gale Stradley, remembering the storm’s wrath during a recent interview.

Stradley and her husband stayed with friends while they waited for floodwaters to subside. “The water came up above our windows and our house sat in water for seven long days,” she said. “It was a scary picture. We lost every single thing, and my husband’s business was (run) out of our house.”



During Hurricane Isabel the Stradley’s home stayed high and dry.

“We never wanted to go through that again,” Stradley said, adding that by taking the mitigation measure to elevate their home, the retired couple’s flood insurance premiums were reduced. “Thanks to government’s help, we’re still independent and living in our own home.” And how did they make it through Hurricane Isabel? “Just fine. We had debris in our yard but our house and possessions stayed safe and dry.”

Unfortunately, not all the residents and businesses in the area where the Stradleys live were protected from Isabel’s wrath. “I feel so badly for those folks. If you don’t think they were sweating this one...” her voice trailed. “It was bad.”

As a result of Hurricane Isabel, President George W. Bush has declared 99 jurisdictions including 69 counties and 30 independent cities eligible for federal disaster assistance. This is Virginia’s second major disaster declaration this year. In March, six counties and three cities were federally declared major disaster areas after winter storms; floods and landslides struck in the north and west parts of the state.

Laird Leask – FEMA



Gale Stradley standing in front of her dry home.

“I can’t say enough about what the people at FEMA did for us,” she continued “There was a woman from New York State named Rosa and she was so wonderful, she walked us through every last thing we had to do (for FEMA assistance). I can’t say enough about the help we received,” Stradley added.

With the help of FEMA grants for temporary housing and a low-interest loan from the U.S. Small Business Administration through their own bank, the Stradley’s were able to rebuild and elevate their home, moving it out of harms way.



This building near the Stradley home didn’t fair as well.

HurricaneSafe

This publication was created by the FEMA Region 10 mitigation division on behalf of FEMA Region 3 for the recent hurricane disaster in Virginia resulting from Hurricane Isabel.



FEMA



VIRGINIA
DEPARTMENT
OF EMERGENCY
MANAGEMENT

On-line Education for Homeowners

FEMA is developing several new multimedia tutorials to provide in-depth training in different facets of the National Flood Insurance Program (NFIP) and to support FEMA’s public education and outreach efforts. Recent improvements to the FEMA web page provide an array of training opportunities for anyone interested in learning

more about the NFIP and related topics. On-line tutorials walk you through reading Flood Insurance Rate Maps (FIRM’s), understanding GIS, Elevation Certificates, and much more. For a more detailed explanation of all these services, visit FEMA on-line at:

www.fema.gov/fima/education.shtm

Do you need Flood Insurance?

How do I know if I'm in the Floodplain?

The floodplain is identified as “Special Flood Hazard Areas” in your community’s Flood Insurance Study and the accompanying Flood Insurance Rate Maps (FIRMs). The flood level shown for these Special Flood Hazard Areas has a 1% chance of being equaled or exceeded in any one year. That translates into a 26% chance of flooding over a typical 30-year mortgage period as compared to a 1% chance of fire damage over the same period. The building permit officials in your community have these documents available for you to see.

What is Substantial Damage?

Substantial Damage is damage of any origin to a structure where the cost of restoring the structure to its before damage condition would equal or exceed fifty percent (50%) of its pre-damage value.

When does the NFIP affect me?

The NFIP requires participating communities to regulate, with permits, any new or substantially improved structures during non-disaster periods and to monitor and identify any substantially damaged structures as a result of a disaster within the community’s floodplain areas. Participating communities adopt an ordinance that requires any new buildings to be elevated above the projected flood level within the identified floodplain. Nonresidential buildings have the additional option of being dry flood proofed. Existing buildings that are substantially damaged or improved (50% or more) must be elevated or flood proofed to meet the same construction code standards as new construction. When you apply for a local building permit you will be informed if you are in a floodplain and what further steps are required to repair or reconstruct your building. If your building was flooded but not substantially damaged there is a wide range of inexpensive measures described in this booklet that can help you reduce future flood damage.



A structure in Clairemont Beach damaged by Hurricane Isabel.

Counterpoint

Why go through all this trouble?

First, typical homeowner and business insurance does not cover damage caused by a flood. Second, as a participating community in the National Flood Insurance Program (NFIP), your community is required to enforce its floodplain regulations. Third, structures located in the floodplain, which are not elevated or flood proofed, are a threat to the health and safety of the occupants. Fourth, structures that do not take into consideration the flood risks, will repeatedly need to be bailed out by the government (usually through the NFIP or various disaster assistance programs) when flooding reoccurs.

What happens if I refuse to comply?

If you do not obtain a permit and do not elevate or flood proof, then your community could take legal action against you. This could include halting development, revoking the permit, imposing a fine, or withholding a certificate of occupancy . If the

structure is in violation of the regulations, flood insurance premiums could be extremely costly, possibly making the structure difficult to sell. Also, your community could be placed in jeopardy for continued participation in the NFIP.

What if I have more questions?

Your building permit and floodplain management officials are responsible for implementing the requirements of the local floodplain management ordinance, including the substantial damage provisions. Following a disaster declaration, the requirements pertaining to substantial damage will be presented to your community officials in detail at meetings held in various locations throughout the state. FEMA will work with building officials to help them identify structures which may qualify as substantially damaged. In addition, FEMA will provide technical assistance to local building officials concerning the repair or reconstruction of substantially damaged structures.

What is the National Flood Insurance Program?

The National Flood Insurance Program (NFIP) is a federal program enabling property owners to purchase flood insurance. It is based on an agreement between your community and the federal government. The agreement states that if your community adopts and enforces floodplain management regulations, which at least meet minimum federal requirements, the federal government will make flood insurance and flood disaster assistance available in your community.

How Do I Purchase Flood Insurance?

Flood Insurance is not available everywhere. It is available only to residents of communities participating in the National Flood Insurance Program (NFIP). For more information and to find out if your community participates in the NFIP, call 1-800-427-4661.

If your community is participating in the National Flood Insurance Program you can purchase insurance for your property. There are no restrictions. All insurance agents can sell flood insurance policies. If your agent is not aware of the procedures for selling flood insurance policies, please call (800) 720-1093 for a referral to an insurance agent in your area who writes NFIP policies.

How Do I File A Flood Insurance Claim?

If you experienced flood damage and are covered by flood insurance, these important steps will help you when filing your flood insurance claim.

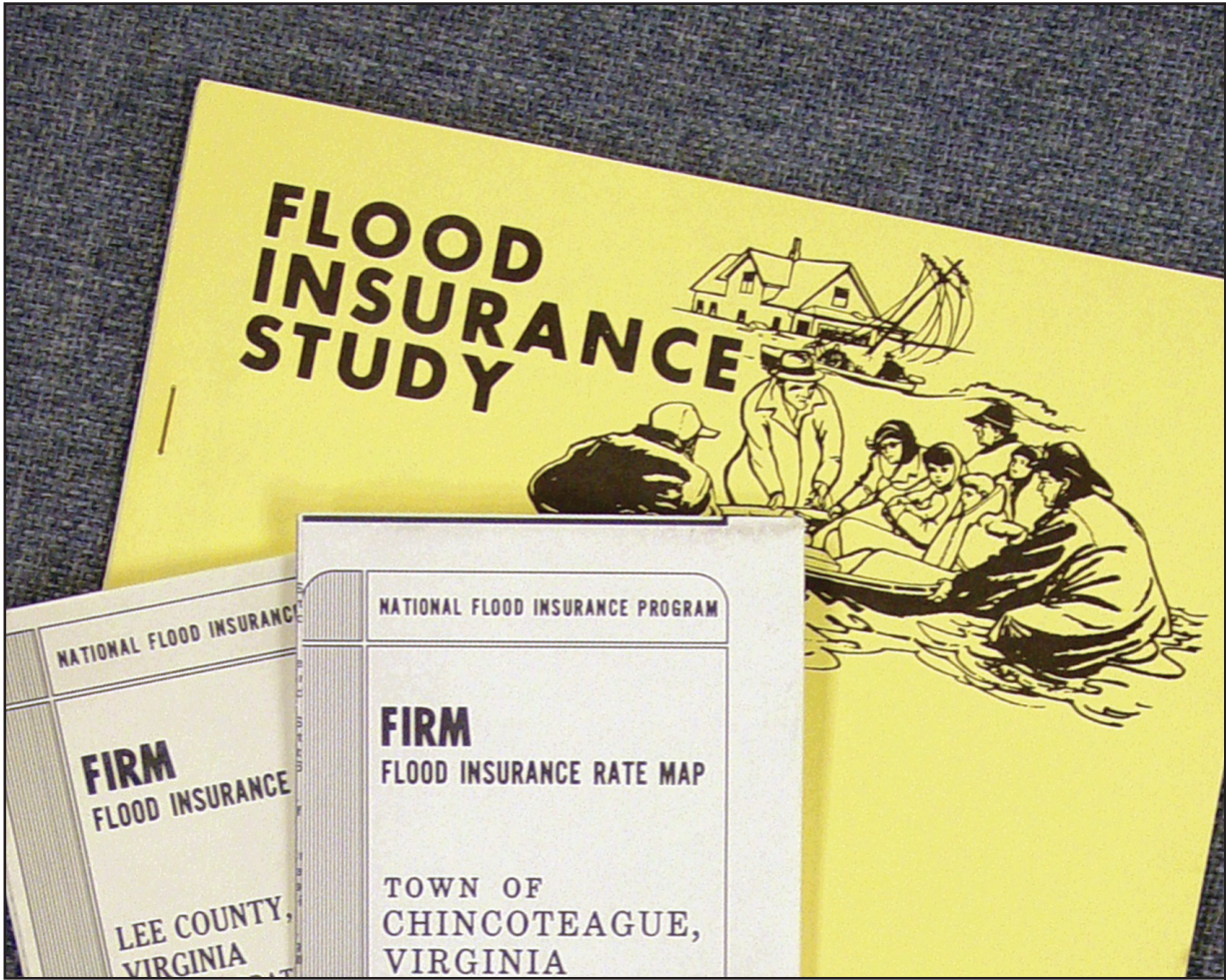
1. Save as many damaged articles as possible. If you must throw items out, take pictures to document your losses.
2. Contact your insurance agent right away.

Once your insurance agent has your claim:

1. The agent will file a Notice of Loss.
2. An adjuster will be assigned to your case.
3. Once the loss has been adjusted, a Proof of Loss will be submitted, and payment can be made. Partial payment can be made to claimants upon submission of a partial Proof of Loss.

Do I Still Need to Make an Application to FEMA ?

All property owners who had damages caused by the federally declared flood event should make an application for disaster assistance. The applications are routed through the different disaster programs and homeowners are notified if they are eligible for assistance beyond their flood insurance claim.



FEMA Flood Map Store

The Map Service Center’s FEMA Map Store is FEMA’s on-line site for National Flood Insurance Program. It provides on-line access to FEMA’s 120,000+ flood maps and related products.

Customers can view products on-line at no cost, and place orders via secure credit card payment processing, as well as download the Flood Insurance Rate Maps (FIRMS), Flood Hazard Boundary Maps (FHBMs), and Flood Insurance Studies (FIS). The FEMA Flood Map page is found at www.fema.gov/maps.

The Flood Insurance Study and FIRM maps shown at left are some of the more common products available at the FEMA Flood Map Store.

Myths and Facts about the National Flood Insurance Program (NFIP)

Who needs to buy flood insurance?

Everyone. And everyone in a participating community in the National Flood Insurance Program (NFIP) can buy flood insurance. To clear up some misconceptions about National Flood Insurance, the NFIP has compiled the following list of common myths about the program, and the real facts behind them, to give you the full story about this valuable protection.

Myth: You can’t buy flood insurance if you are located in a high-flood-risk area.

Fact: You can buy Federal flood insurance no matter where you live – as long as your community participates in the NFIP. The NFIP provides affordable flood insurance coverage for any walled and roofed building whether it is in a mapped floodplain area, or in areas where no floodplain map exists.

Myth: Homeowner’s insurance policies cover flooding.

Fact: Unfortunately, many homeowners do not find out until it is too late that their homeowner policies do not cover flood damages. Only National Flood Insurance covers damage to your home and belongings caused by flooding.

Myth: Only residents of high-risk flood zones need to insure their property.

Fact: Even if you live in an area that is not flood-prone, it’s advisable to have flood insurance. Over 25 percent of the NFIP’s claims come from outside high-flood-risk areas. If you live in an area not shown as a floodplain, not only can you buy insurance, but the rates you pay will be less than if you lived in a mapped floodplain.

Myth: The NFIP does not offer any type of basement coverage.

Fact: Yes, it does. While flood insurance does not cover basement improvements, such as finished walls, floors or ceilings, or personal belongings that may be kept in a basement, such as furniture or other contents, it does cover structural elements, essential equipment and other basic items normally located in a basement. The following items are covered in a basement, as long as they are connected to a power source and used as intended:

- Sump pumps
- Well water tanks and pumps
- Oil tanks and the oil in them
- Gas tanks and the gas in them
- Furnaces, water heaters, air conditioners, and heat pumps
- Electrical junction and circuit breaker boxes, and required utility connections
- Foundation elements
- Stairways, staircases, and elevators
- Unpainted drywall and sheet rock walls and ceilings and fiberglass insulation
- Cleanup
- Clothes washers and dryers and food freezers (*with contents coverage only*)

Myth: Federal disaster assistance will pay for any flood damage.

Fact: Before a community is eligible for disaster assistance, it must be declared a Federal disaster area. Federal disasters are only declared with a request from the governor following widespread and devastating flooding. The premium for an NFIP policy, averaging \$360 a year nationally, is less expensive than the annual interest paid on Federal disaster loan

Covering Compliance Costs

If your home or business is damaged by a flood, you may be required to meet certain building requirements in your community to reduce future flood damage before you repair or rebuild. To help you cover the costs of meeting those requirements, the national Flood Insurance Program includes additional coverage known as **Increased Cost of Compliance (ICC)** coverage.

How Much Coverage is Available

Flood insurance policyholders in high-risk areas, also known as special flood hazard areas, can get up to \$30,000 to help pay the costs to bring their home or business into compliance with floodplain ordinances.

Four Options Covered

There are four options you can take to comply with your community’s floodplain management ordinance and help you reduce future flood damage. You may decide which of these options is best for you:

Elevation – This raises your home or business to or above the flood elevation level adopted by your community

Relocation – This moves your home or business out of the floodplain, and thus out of harm’s way.

Demolition – This tears down and removes flood-damaged buildings.

Floodproofing – This option is available primarily for non-residential buildings. It involves making a building watertight.

Filing a Claim

You can only file an ICC claim if your community determines that your home or business has been substantially damaged or repetitively damaged by a flood. This determination is made when you apply for a building permit to begin repairing your home or business. Once your community has made this determination, contact the insurance company or agent who wrote your flood policy to file an ICC claim.

Is It Possible to Relocate My House?

Yes! Whether you relocate just your family and belongings or you choose to move your entire house structure, relocation out of the floodplain is the retrofitting technique that can offer the greatest security from future flooding. Moving the whole building away from danger can also assure that another family will not be in a disastrous situation in the future. Relocation relieves the homeowner from future anxiety about flooding, eliminates flood insurance payments, and assures continuity in people's lives during future flooding events.

The first stages of relocation are similar to those used for elevation. Once the house is elevated, instead of putting it back down on a raised foundation, it is placed on a heavy duty truck bed, transported to a new site out of the floodplain, and set on a new conventional foundation.

Considerations

If your present lot has a good building location on higher ground, you can plan to put the structure at that location. You may need to purchase a new lot if your existing site is completely in the floodplain. Be certain the site is accessible and the pathway is clear to move the existing structure. Also, make sure utilities are available and proper permits have been obtained. A house must also be in sound structural condition in order to be moved. A house in poor condition will need so much bracing that moving it may become financially impractical. Consult a building professional if you are uncertain about the condition of your structure. Single-story frame houses over a crawlspace or basement are the easiest to relocate, while homes that are slab-on-grade or multistory are more difficult. It is feasible to move even the heaviest houses, such as those of brick or block, or very large ones, though this will generally be more expensive.

Moving a house is a complex operation that must be done by a professional. There are professional contractors who specialize in house moving. They understand the issues involved and know how to coordinate the project. Obtain bids from several house movers and contractors.

Basic Steps in Elevating a Building:

1. Have *appropriate professionals* disconnect all utilities.
2. Hire a *professional house mover* to disconnect your house from the existing foundation, jack it up to the new height and provide a temporary foundation.
3. Have the utilities temporarily reconnected so the house is livable while foundation work is done.
4. Build a temporary access stair to meet the new height.
5. Build a new, permanent foundation.
6. Have the house mover lower the house onto the new foundation and connect the anchor bolts.
7. Have the utilities permanently reconnected.
8. Build a new, permanent access stair and landing.

Home Elevation: Where Do I Start?

Most types of homes can be elevated above floodwaters, including wood frame, brick, slab-on-grade, crawlspace or homes with basements. Elevation is an extremely reliable flood proofing method and requires little human intervention to prepare for a flood event. The floor elevation height should be set at a recommended safety margin above the 100-year flood level. Some buildings may be elevated over 9 feet above their existing floor levels. In such an extreme case the new lower level would probably be used as a garage. In all cases, a new entry stair and front porch is built to meet the new height. Elevating a home requires use of professional plumbers/ electricians, house movers, contractors, and structural engineers to help you design your new foundation and obtain a

permit from your building department. Because the new foundation will be in the floodwaters, it is extremely important that it be structurally designed to withstand lateral (sideways) forces such as fast-flowing currents and the impact of waterborne debris.

How high should I elevate my home?

It depends on your reason for raising it. If the local agency responsible for zoning and issuing building permits for your property is participating in the NFIP, the lowest acceptable elevation for your house will be that equal to the elevation of the 100-year flood (a flood that has a probability of occurrence in any year equal to one percent). You will need to obtain the services of a professional surveyor to locate and certify the elevation of the 100-year flood at your house.

Some local zoning agencies have elevation requirements that exceed those for the 100-year flood. For instance, they may require an elevation equal to the 100-year flood plus one foot (or some other value) or an elevation equal to that observed for an historical flood. If your local agency requires this, the procedure for determining the acceptable elevation for your house is the same as given above. If your local agency requires your house to be elevated to a height equal to that of a historical flood, they will have to provide that elevation to you. You will then need to obtain the services of a professional surveyor to locate and certify that elevation at your house.

Finally, you may desire to elevate your house to some level above that required by your local zoning agency. You should be aware that any flood elevation given for your house may be exceeded by a particular flood for several reasons. First, the magnitude (amount of water flowing) of the 100-year flood may increase as more years of data are collected and statistical analyses of flood events are revised. Second, the analysis of the 100-year flood elevations shown for the river responsible for flooding of your property is based on channel conditions at the time



A home being moved in Glasgow Virginia.

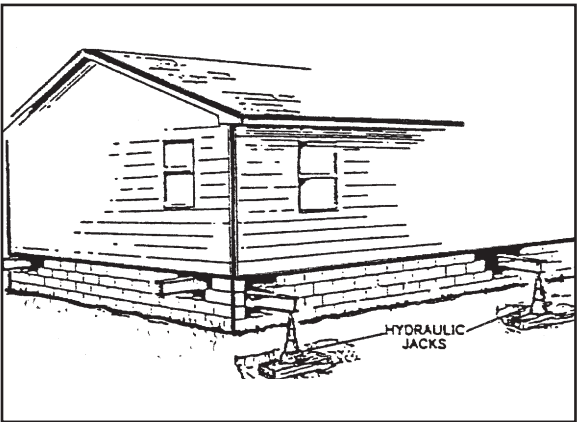


Figure 1: I-beams are placed under lifting points perpendicular to floor joists with a second set beneath for uniform lifting.

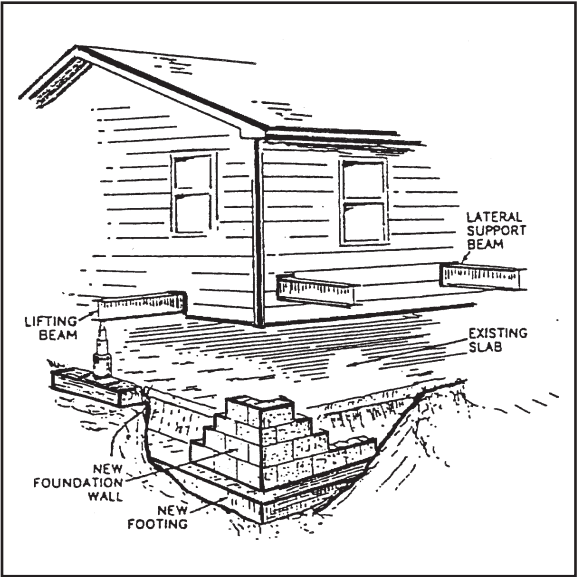


Figure 2: Lifting beams are placed under bearing walls and posts. The house is uniformly lifted using hydraulic jacks.



Coastal home elevated to avoid future flooding.

of the analysis. If the channel conditions have changed since the analysis, the elevation of the 100-year flood given for your house may also have changed by several inches. Third, the analysis of the 100-year flood for the river is based on an inexact science, and the elevations given for your house may not be precise. Fourth, flood levels at your house may rise above the levels required by your local zoning agency due to log, debris, or ice jams downstream from your house.

Because of all the reasons cited above, you may want to elevate your house using a "factor of safety" equal to one or more feet above the elevation required by your local zoning agency. It is worth noting that in many instances, the difference between the 100-year flood and the 500-year flood (a flood having a probability of occurrence in any year of 0.2 per cent) is less than one foot. Adding this "factor of safety" may protect your house against floods with extreme probabilities of occurrence, provided log, debris, or ice jams do not occur.

How Do I Hire a Contractor?

Sleuthing

If you have been satisfied with work done before by a local licensed contractor, you may want to use that firm. If you haven't used a contractor before, or if you were unhappy with a previous experience, you may have to do some investigating to increase your chances of getting a good one.

- Call your state's Department of Licensing, Contractors' Registration office to be certain the company you are interviewing is properly registered.
- Ask the contractor for proof of insurance. Insurance is usually required by the state and should include a completion bond, disability and worker's compensation insurance. Otherwise, you may be liable for accidents occurring on your property.
- Check on the firm's reputation. Ask the local Better Business Bureau, home builders association, or building trades council. They may be able to tell you if the firm has had unanswered complaints filed against it.
- Ask for references. Reputable contractors should be willing to provide names of previous customers. Contact some of them and ask how well they were satisfied with the job done. Ask if they would hire that contractor again.

Get it in writing

No matter how well you know the contractor or how much you trust him/her, get everything related to the job in writing.

- Get a written estimate. You will need to give the contractor a written scope of work. This should include everything you expect the contractor to do. Be sure to be very thorough with your work request and have plans and materials specified. The contractor will need to know exactly what materials he will be expected to purchase on your behalf and specifically how much of the labor you expect him to complete. Some contractors may charge a fee for an estimate.
- Get more than one contractor to give you an estimate for the job. Even with the same work description you will find that every contractor will give you a different price. When comparing estimates look at them closely and be sure each contractor is pricing out the same work and materials for you.
- Obtain a contract. The contract should be complete and clearly state all the work, costs, and payment schedule. Never sign a blank contract or one with blank spaces. It may be worthwhile to have your attorney look it over if a lot of money is involved.
- Ask for guarantees. Any guarantees from the contractor should be written into the contract. It should include what is guaranteed, who is

responsible for the guarantee (dealer, contractor, manufacturer), and the length of time the guarantee is valid.

- Get a final contract. A signed contract is binding on both you and the contractor. Don't sign completion papers or make the final payment until the work is completed to your satisfaction and approved by your local building inspector.



Beware of Disreputable Activities

Areas recovering from floods are often prime targets for less-than-honest business activities. Here are some points to help safeguard against such practices.

- Beware of "special deals" offered after a disaster by contractors you don't know.
- Beware of unknown contractors wanting to use your house as a "model home."
- Do not sign any contract under pressure by a salesperson. Federal law requires a three day cooling-off period for unsolicited door-to-door sales of more than \$25. If you choose to cancel such a contract

within three business days of signing it, send your cancellation by registered mail.

- Beware if you are asked to pay cash on the spot instead of a check made out to the contracting company. A reasonable down payment is up to 30% of the total project cost.
- Your contractor should call you or a qualified observer to inspect hidden work (e.g., sewers or basement wall) before it is covered over. Most building departments must inspect electrical and plumbing lines before the walls are covered with wallboard or paneling.

Water-Resistant Materials

When taking on mitigation projects it's a good idea to use materials that are highly resistant to flood damage. The following is a list of materials that are highly resistant to flood damage.

Marine Plywood

The most water-resistant plywood. It can be used for floor and exterior-wall sheathing.

Exterior-grade plywood

Meant to resist low-level moisture, humidity. Not for water saturation conditions.

Galvanized nails

Will not rust after being saturated with floodwaters. Use at all locations up to three feet above flood level.

Metal or Fiberglass doors

Will not warp if saturated. The door may rust in spots, but this can be sanded out and repainted. Use at all doors, especially exterior.

Indoor / Outdoor carpet

Use with synthetic carpet pad. Do not permanently fasten down.

Brick, concrete

Not damaged by water saturation, but it must be used in conjunction with a waterproof membrane.

Plastic Wood

Made of recycled plastics in matching shapes of dimensional lumber. Waterproof and dimensionally stable.

Rigid (Closed-Cell) Insulation

Will not deform or lose its insulating properties when wet. Can be dried out and reinstalled in wall or floor cavity. Use instead of fiberglass insulation.

Greenboard

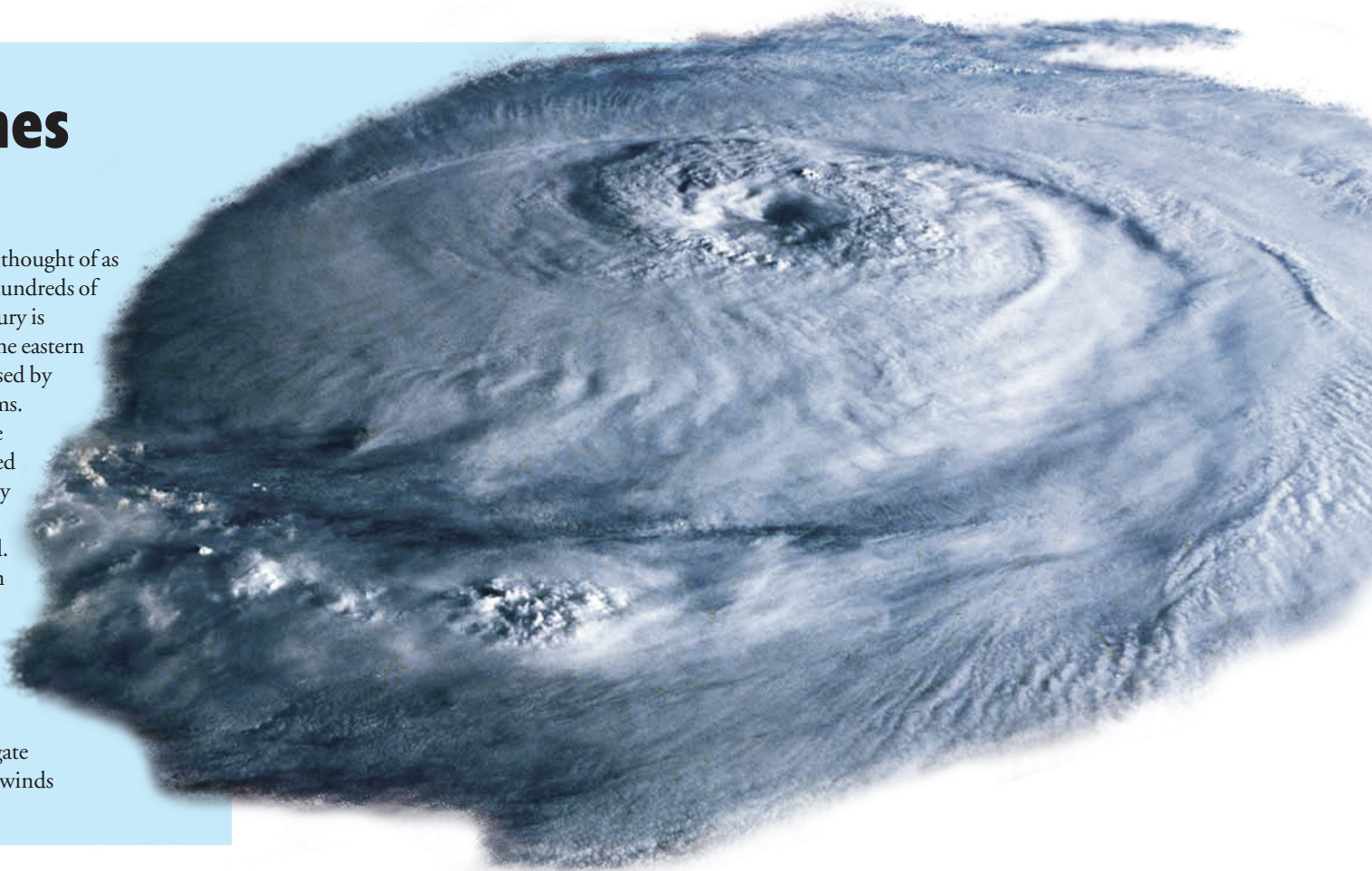
Greenboard is simply moisture-resistant drywall. Manufacturers do not consider greenboard to be a flood proofing material. It can be submerged for several hours without extensive deterioration and it is only slightly more expensive than normal plasterboard.

Synthetic Baseboards

Use instead of wood base.

Hurricanes & Wind

Hurricanes, though often thought of as coastal events, can travel hundreds of miles inland before their fury is diminished. Flooding in the eastern United States is often caused by hurricanes or tropical storms. Flooding however isn't the only kind of damage caused by hurricanes. The primary damage from hurricanes comes in the form of wind. A category 4 hurricane can produce winds of more than 150 MPH; strong enough to rip the roof off of a house. This section presents some steps you can take to mitigate against the effects of high winds during a hurricane.



Protecting Your Home From Wind

Once a hurricane or major storm hits, it's too late to protect your home and property. But there are things you can do now to limit future wind damage. Some are fairly simple and inexpensive; others will require a contractor. You'll need to consider the characteristics of your home, your financial resources and the building codes in your community. This homeowner's checklist will help you learn what you can do. For more information about the costs and benefits of each approach, talk to a professional builder,

Are windows protected by storm shutters?

Installing storm shutters is one of the most effective ways to protect your home. Purchase or make shutters for all exposed windows, glass surfaces, French doors, sliding glass doors and skylights. There are many types of manufactured storm shutters available made out of wood, aluminum or steel. You can also make storm shutters with 5/8-inch thick exterior-grade plywood.

Are double entry doors secured at the top and bottom?

The exterior walls, doors and windows are the protective shell of your home. If the shell is broken during a storm, high winds can enter the home and put pressure on the roof and walls, causing serious damage. For each double door, at least one of the doors should be secured at both the top of the door frame and the floor with sturdy sliding bolts. Most bolts that come with double doors, however, are not strong enough to withstand high winds. Your local hardware can help you select the proper bolts. Some door manufacturers provide reinforcing bolt kits made specifically for their doors.

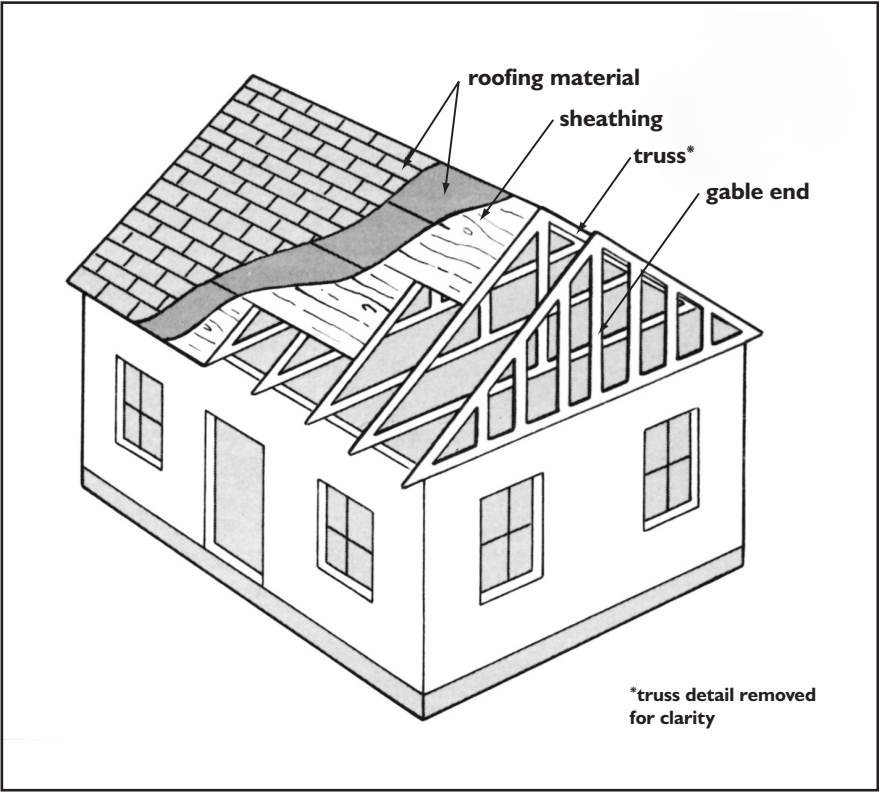


Figure A

Is the roof sheathing properly installed?

During a windstorm, wind forces are carried from the roof down to the exterior walls and then further down to the foundation. Homes can be damaged when wind forces are not properly transferred to the ground. Roof sheathing (the boards or plywood nailed to the roof rafters or trusses; see **Figure A**) can fail during a hurricane if not properly installed. Examine the sheathing from the attic. If many of the nails have missed the rafters, you may need to re-nail the sheathing. If you're putting on a new roof, make sure the sheathing complies with correct recommended practices.

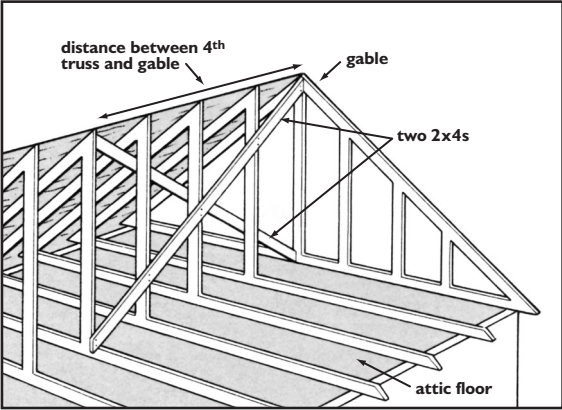


Figure B

Are end gables securely fastened to the rest of the roof?

In a hurricane or other wind storm, the side walls of the roof (end gables) take a real beating and can collapse. Gable bracing often consists of 2x4's placed in an "X" pattern at both ends of the attic; from the top center of the end gable to the bottom of the brace of the fourth truss, and from the bottom center of the end gable to the peak of the roof (as shown in **Figure B**).

Has the garage door been properly secured?

If the garage door fails, winds can enter your home and blow out doors, windows, walls and the roof. Ask your building department for guidance on what to do.

If you're building or remodeling a home, there are many other ways to protect your property that are not addressed in this checklist. To learn more, talk to a professional home builder, architect, contractor or building supply retailer.

architect or contractor. You should also ask your building department about building permit requirements.

Do you know your risk?

Ask your emergency management office or American Red Cross chapter for information about the hazards in your community.

Is the roof fastened to the walls with hurricane straps?

Hurricane straps (made from galvanized metal) help keep the roof fastened to the walls in high winds. They can be difficult to install, so you may need a contractor for this project. Ask your building department if hurricane straps are required or advisable in your area.

Can Your Trees Be Saved?

A storm can leave trees looking like there's no tomorrow. Major limbs may be broken or damaged, foliage can be shredded or stripped, or the bark may be torn or gouged. But what at first glance may look like mortal wounds are not necessarily fatal to a tree. Trees have an amazing ability to recover from storm damage.

First, Assess the Damage

Before writing off a damaged tree homeowners should evaluate their trees by asking the following questions:

- **Other than the storm damage, is the tree basically healthy and vigorous?** If the tree is basically healthy, is not creating a hazard, and did not suffer major structural damage, it will generally recover if first aid measures are applied immediately after the storm.
- **Are major limbs broken?** The larger a broken limb is, the harder it will be for the tree to recover from the damage. If a majority of the main branches are gone, the tree may have little chance of surviving.
- **Has the leader (the main upward-trending branch on most trees) been lost?** In species where a leader is important to upward growth or desirable appearance, it may have to be a judgment call. The tree may live without its leader, but at best would be a stunted or deformed version of the original.
- **Is at least 50 percent of the tree's crown (branches and leaves) still intact?** This is a good rule of thumb on tree survivability. A tree with less than half of its branches remaining may not be able to produce enough foliage to nourish the tree another season.
- **How big are the wounds where branches have been broken or bark has been damaged?** The larger the wound is in relation to the size of the limb, the less likely it is to heal, leaving the tree vulnerable to disease and pests. A 2–3 inch wound on a 12-inch diameter limb will seal over with new bark within a couple of years.

- **Are there remaining branches that can form a new branch structure?** The remaining limbs will grow more vigorously as the tree tries to replace its missing foliage. Look to see if branches are in place that can eventually fill out the tree's appearance.
- **Is the tree of a desirable species for its location?** If the tree is in a bad location (such as a potentially tall tree beneath a power line), it may be best to remove it if it has serious damage.

Then, Make the Decision

The questions listed above will help you make informed decisions about your trees. In general, the answer of what to do about a particular tree will fall into one of three categories:

It's a Keeper

If damage is relatively light, prune any broken branches, repair torn bark or rough edges around wounds, and let the tree begin the process of wound repair.

A mature shade tree can usually survive the loss of one major limb. The broken branch should be pruned back to the trunk. In the months to follow, large wounds should be closely monitored for signs of decay. Sometimes the tree will have only received minor damage throughout. In this case enough strong limbs may remain on a basically healthy tree to make saving it possible. Young trees can sustain quite a bit of damage and still recover quickly. If the leader is intact and the structure for future branching remains, remove the broken branches and let the tree close its wounds.

Wait and See

If a valuable tree appears to be a borderline case, resist the desire to simply cut the tree down and be done with it. In such cases, it may be best to stand back for a while and think it over. Remember that time is on your side. After careful pruning of broken branches, give the tree some time to recover. A final decision can be made later.

Resist the temptation to prune too heavily. Remember that the tree will need all the foliage it can produce in order to make it through the next growing season. Remove only the damaged limbs, wait and see what happens. A healthy mature tree can recover even when several major limbs are damaged. With large trees you'll want to employ the experience of a licensed professional arborist.

Say Goodbye

Some trees simply can't be saved or are not worth saving. If the tree has already been weakened by disease, if the trunk is split, or more than 50 percent of the crown is gone, then the tree is not salvagable.

Don't Try to Do It All Alone

Some of your trees may have damage that's too close to call, or may have hidden damage. To help with such questions, a tree professional may be needed to help you decide what to do about your trees. Don't hire just anyone who shows up at your door following a storm. Look for qualified arborists in the phone book or by contacting your state or city forester.

Article and photos courtesy of The National Arbor Day Foundation

Avoiding Future Tree Damage

When a major storm strikes, some trees seem to be able to come through little damage, while others lose large limbs or sizable parts of their structure. In some cases, trees may be split in two or may have just a trunk left standing.

There are preventive measures that property owners can take to make their trees stronger and more resistant to storms. Below are five suggestions for pruning a tree that will promote the growth of strong branches:

Encourage good branch angles.

For most deciduous trees, narrow angles between branches signal a point of future weakness. As two branches grow closely together, neither has sufficient space to add the wood needed for strength.

To prevent this, remove one of the two branches when the tree is young. For best branch strength, the ideal branching angle in many broadleaf tree species approximates 10 o'clock or 2 o'clock as shown in **Figure A**.

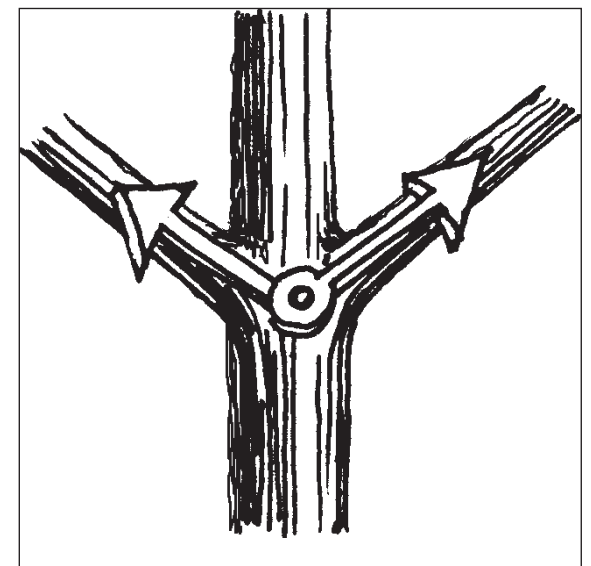


Figure A

Strong branch/trunk size relationships.

The relative size of lateral branches is also important in determining branch strength. Ideally, lateral branches should be less than 1/2 to 3/4 the diameter of the trunk. Branches larger than that are often heavier than the trunk can support, and may break in a storm. Trees grow by adding new layers of wood on the trunk and branches each year. As the trunk grows, it will strengthen the joints with branches by adding wood around it.

Maintain a stable center of gravity

Wind, winter snow loads, or previous loss of a major limb can create situations where the tree's center of gravity is not positioned over the trunk. When a severe storm hits, a slight bit of extra weight or wind pressure can break limbs, snap the trunk off, or even topple the tree. You can help reposition a tree's center of gravity by selectively removing branches on the leaning side and encouraging branches on the opposite side.

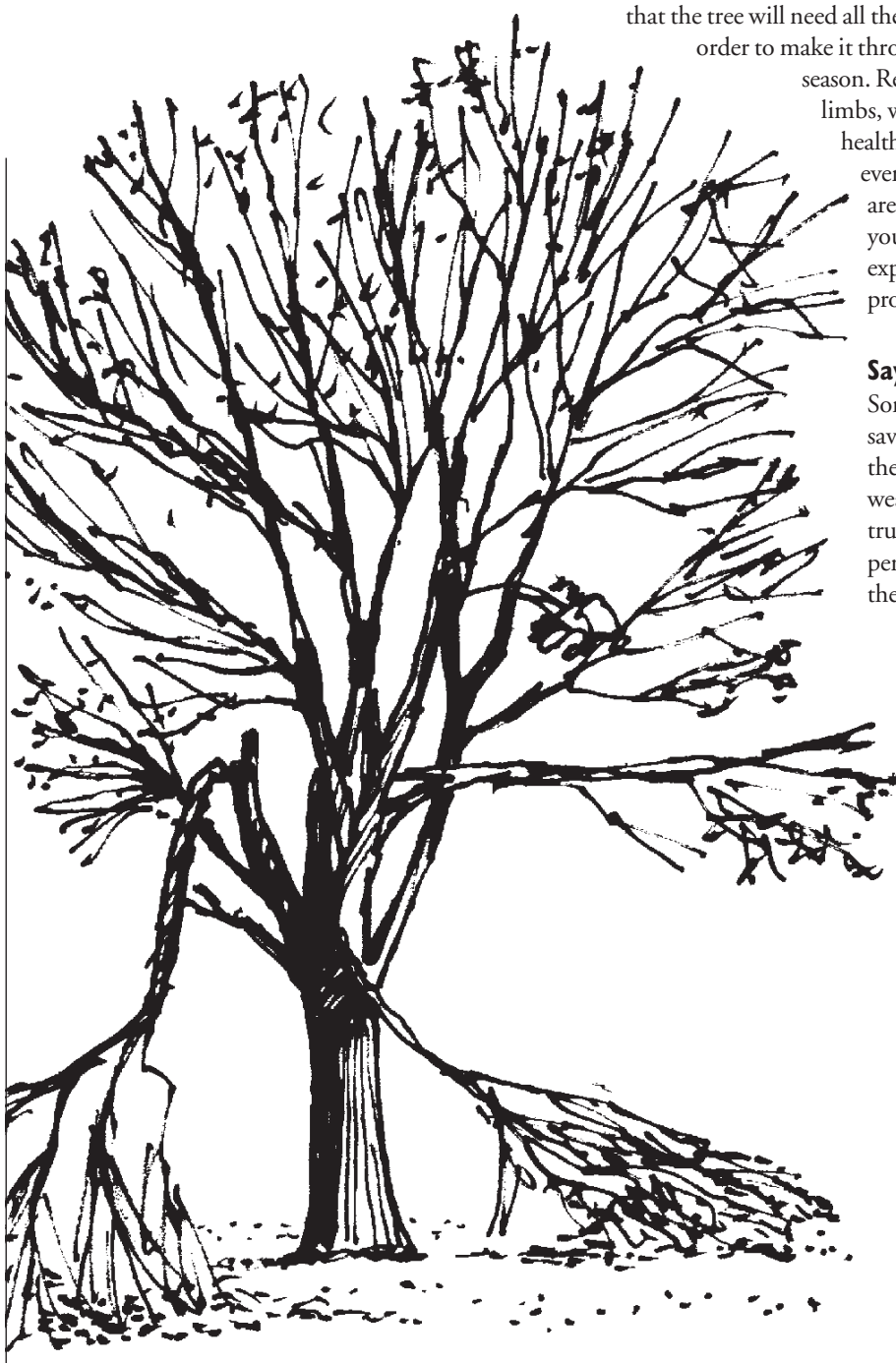
Remove rubbing branches

Branches that rub against each other produce wounds and decay. One of the offending branches should be removed. Watersprouts and suckers can occur at the base of the tree or inside the crown. They are upright branches that do not follow the tree's normal growth pattern. On trees that have been severely damaged, these kinds of branches may be temporarily needed to provide foliage. In healthy trees, however, they most often use more energy than they return to the tree, and it is best to remove them as soon as possible.

Don't cut branches back to stubs

Often people have the idea that long natural limbs on a tree will break more easily in a storm, and should be cut back to make them stronger. This is not true. When a branch is cut back to a stub, new branches will grow from the edges of the stub. These new branches will not form a strong union with the stub and are much more likely to break. If a branch needs to be removed, cut it back to the collar near the base of the branch, not flush with the trunk.

Article and photos courtesy of The National Arbor Day Foundation



Pumping Out a Flooded Basement

If your basement is flooded, don't rush to pump it out. Water in the ground outside your house is pushing hard against the outside of your basement walls; and the water inside your basement is pushing right back (Figure A). If you drain your basement faster than the water outside drains out of the ground, the outside pressure will be greater than the inside pressure. This unequal pressure may cause the floor to crack then buckle and the wall to crack and possibly collapse (Figure B).

How to Safely Pump Water Out of Your Basement

- Never go into a flooded basement unless you are sure the electricity is off.
- Start pumping the water out of the basement when floodwaters no longer cover the ground.
- Gasoline engines create deadly carbon monoxide exhaust fumes. Don't use gasoline-powered pumps or generators indoors.
- Pump the water level down 2 to 3 feet. Mark the level, and wait overnight.
- Check the water level the next day. If the water level went back up over your mark, it is still too early to drain your basement.
- Wait 24 hours, then pump the water down 2 to 3 feet again. Mark the level and check it the next day.
- When the water stops rising, pump down another 2 to 3 feet and wait overnight. Repeat steps 4 and 5 until all water is pumped out of the basement.

What to Do After Draining Your Basement

- Disinfect the floors and walls to remove bacteria left from the floodwaters.

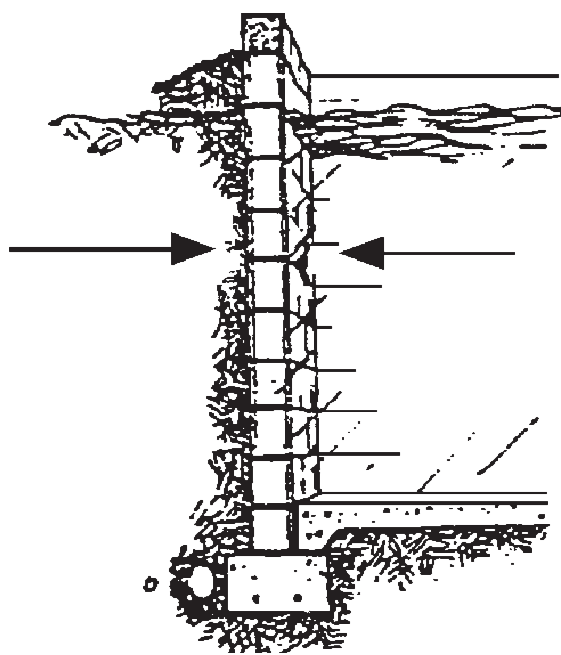


Figure A

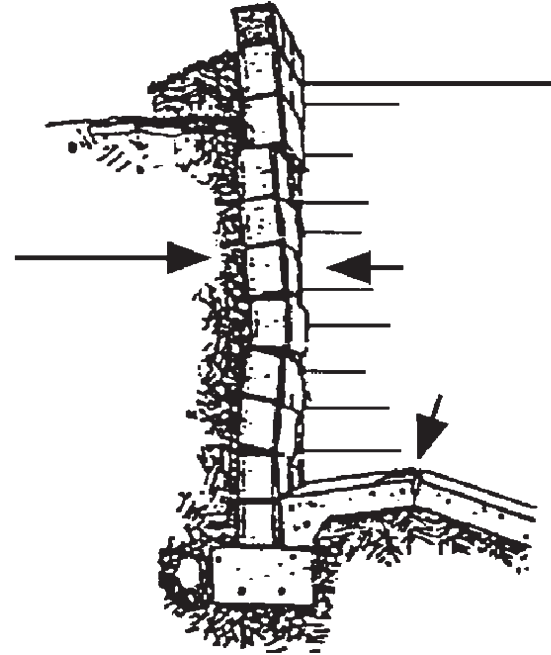


Figure B

- Before turning the power back on, check any electrical service that may have been damaged. Replace any wiring, switches, outlets that were submerged or got wet during the flood.
- Remove heating and air conditioning vents or registers as soon as possible and hose out the ductwork. Flooded ducts contain mud and bacteria. Ductwork comprised of flexible hose cannot be hosed out; you have to replace it.
- Check your water system for loose pipes and leaks.
- Check your water supply to be certain it is not contaminated.
- Check all other utilities and drains for damage from the floodwaters.

Cleaning Up & Drying Out Your Home

If your house or its understructure have been under water from the recent flooding, you will need to take important steps to clean out bacteria and mold, and dry the building out thoroughly.

Steps for drying out the house

- Turn off the main power.
- Open up the house to allow moist air to escape.
- Remove all wet furniture, contents and carpets or rugs. If you decide to keep some of these items they must be cleaned and disinfected.
- Discard all contaminated food products.

Interior Walls: Interior plaster walls will need to be drained if they are still holding water. Remove the baseboard trim and drill holes about 2" above the floor to let the water out. The holes can be hidden behind the reinstalled baseboards. Flood soaked sections of wallboard will usually have to be removed and thrown away. Paneled walls can usually be dried out by prying out the bottom corner of the paneling and propping it out away from the wall studs.

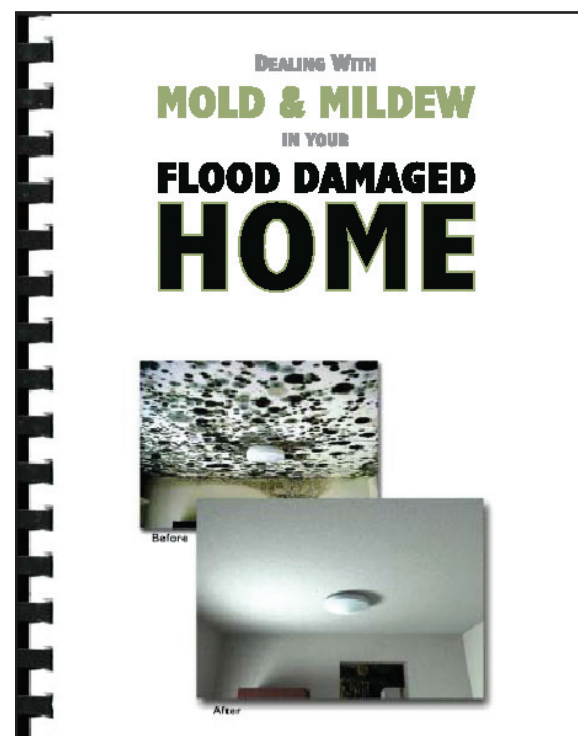
Exterior Walls: Insulation in exterior walls will hold moisture and bacteria. It is important to remove any flood soaked insulation as soon as possible so the other building

materials can dry out properly. Batt insulation and blown-in insulation cannot be reused in your repairs and must be thrown away. Rigid foam insulation can be removed and disinfected. Once it is completely dry it can be reinstalled in the wall cavity. Once the insulation is removed the wall must be disinfected and thoroughly dried. Dehumidifiers and portable heaters can speed this process up.

Floor Framing: If the flood waters got into your floor framing but not into your house you will need to check for wet floor insulation. Wet floor insulation must be removed and the framing disinfected and dried out in the same manner as the walls.

Disinfecting: Disinfect all surfaces that were soaked by flood waters with "disinfecting" or "sanitizing" products. An alternative is to use a mixture of ¼ cup liquid chlorine bleach mixed into one gallon of water. Remove mildew using household mildew removers or fungicides.

Reconstruction: Reconstruction materials should be water resistant. Use water resistant or waterproof wallboard for interior wall surfaces instead of regular wallboard or plaster. Install wallboard horizontally. Use rigid foam insulation instead of batt or blown-in insulation. Use galvanized or stainless steel hardware. Use indoor-outdoor carpeting. Use exterior grade plywood for sub-floor reconstruction.



This booklet on mold is available on-line

The Problem with Mold

One problem that often occurs after a flood is the development of mold. Mold growths, or colonies, can start to grow on a damp surface within 24 to 48 hours. Molds digest organic material, eventually destroying the material they grow on. In addition to the damage molds can cause in your home they can also cause mild to severe health problems.

If your home has water damage due to flooding, sewage back-up, plumbing or roof leaks, damp basement, overflows from sinks or bathtub, or high humidity mildew and mold will develop within 24-48 hours of water exposure. Even worse, it will continue to grow until steps are taken to eliminate the source of moisture and effectively deal with the mold problem. FEMA now offers a publication called "Dealing with Mold and Mildew in Your Flood Damaged Home." This booklet will help you determine the severity of your mold problem. It will also provide steps you can take to make you house normal again. This booklet is available in a printable Adobe Acrobat (PDF format) document on-line at this address:

www.fema.gov/pdf/reg-x/mold_mildew.pdf